

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-19. (Cancelled)

20. (Currently Amended) A turbine engine component, comprising:

a substrate;

a diffusion-controlling layer affixed to the substrate, ~~wherein the diffusion-controlling layer is a metal selected from the group consisting of pure metals or alloys that do not form brittle and/or low melting phases due to interaction with the erosion resistant protective structure or the substrate;~~ and

an erosion resistant protective structure affixed to the diffusion-controlling layer, wherein the erosion resistant protective structure comprises a shape memory alloy, wherein the diffusion-controlling layer is a metal selected from the group consisting of pure metals or alloys that do not form brittle and/or low melting phases due to interaction with the erosion resistant protective structure or the substrate.

21. (Canceled)

22. (Original) The turbine component of Claim 20, wherein the diffusion-controlling layer is a metal selected from the group consisting of Nb, Hf, Ta, and Zr.

23. (Original) The turbine component of Claim 20, wherein the substrate is an alloy selected from the group consisting of a nickel based alloy, a cobalt based alloy, a titanium based alloy, and a steel based alloy.

24. (Original) The turbine component of Claim 20, wherein the shape memory alloy comprises nickel-titanium based alloys, indium-titanium based alloys, nickel-aluminum based alloys, nickel-gallium based alloys, copper based alloys, gold-cadmium based alloys, iron -platinum based alloys, iron-palladium based alloys, silver-cadmium based alloys, indium-cadmium based alloys, manganese-copper based alloys, ruthenium-niobium based alloys, ruthenium-tantalum based alloys, titanium based alloys, iron-based alloys, or combinations comprising at least one of the foregoing alloys.

25. (Original) The turbine component of Claim 20, wherein the shape memory alloy comprises a composition selected to exhibit an austenite phase at an environmental temperature in which the turbine engine component is disposed or operates and a martensite phase at about a temperature lower than the environmental temperature or operating temperature.

26. (Original) The turbine component of Claim 20, wherein the shape memory alloy comprises a composition selected to exhibit an superelastic phase at an environmental temperature in which the turbine engine component is disposed or operates and a martensite phase at about a temperature lower than the environmental temperature or operating temperature.

27. (Original) The turbine engine component of Claim 20, wherein the shape memory alloy comprises a composition selected to exhibit a martensitic phase at an environmental temperature in which the turbine engine component is disposed or operated.

28. (Original) The turbine component of Claim 20, wherein the substrate comprises a turbine nozzle, shroud, shroud hanger, bucket, airfoil, fan blades, pressure balance seal, or a combustor.

29. (Original) The turbine component of Claim 20, wherein the diffusion-controlling layer is at a thickness effective to prevent interdiffusion of the shape memory alloy or the shape memory alloy composite with the substrate.

30. (Original) The turbine engine component of Claim 20, wherein the shape memory alloy is a component of a composite.

31. (Original) The turbine engine component of Claim 30, wherein the composite further comprises at least one hard particulate phase.

32. (Original) The turbine engine component of Claim 31, wherein the at least one hard particulate phase comprises a boride particulate, an oxide particulate, a nitride particulate, a carbide particulate, or combinations comprising at least one of the foregoing particulates.

33. (Original) The turbine engine component of Claim 30, wherein the composite comprises alternating layers of the shape memory alloy and a metallic or a ceramic layer.

34. (Original) The turbine engine component of Claim 33, wherein the metallic layer is selected from the group consisting of Ti, Ni, Co, Ti-based alloys, Ni-based alloys, Co-based alloys, and Fe-based alloys.

35. (Original) The turbine engine component of Claim 33, where in the ceramic layer is selected from the group consisting of borides, oxides, nitrides, carbides, TiN, Y₂O₃, and TaC.

36. (Original) The turbine engine component of Claim 30, wherein the composite further comprises grains having a grain size less than 2 micrometers.

37-67. (Canceled)

68. (Previously presented) An insert for repairing a turbine component, comprising:
a substrate dimensioned to be inserted into a recess formed in a turbine component; and
an erosion resistant protective structure formed on a surface of the substrate, the erosion resistant protective structure comprising a shape memory alloy; and
a diffusion-controlling layer intermediate the substrate surface and the shape memory alloy, wherein the diffusion-controlling layer is selected from the group consisting of pure metals or alloys that do not form brittle and/or low melting phases due to interaction with the erosion resistant structure and/or substrate.

69. (Original) The insert of Claim 68, wherein the shape memory alloy comprises nickel-titanium based alloys, indium-titanium based alloys, nickel-aluminum based alloys, nickel-gallium based alloys, copper based alloys, gold-cadmium based alloys, iron -platinum based alloys, iron-palladium based alloys, silver-cadmium based alloys, indium-cadmium based alloys, manganese-copper based alloys, ruthenium-niobium based alloys, ruthenium-tantalum based alloys, titanium based alloys, iron-based alloys, or combinations comprising at least one of the foregoing alloys.

70. (Original) The insert of Claim 68, wherein the shape memory alloy is a component of a composite.

71. (Original) The insert of Claim 70, wherein the composite further comprises at least one hard particulate phase.

72. (Original) The insert of Claim 71, wherein the at least one hard particulate phase comprises a boride particulate, an oxide particulate, a nitride particulate, a carbide particulate, or combinations comprising at least one of the foregoing particulates.

73. (Original) The insert of Claim 70, wherein the composite comprises alternating layers of the shape memory alloy and a metallic or a ceramic layer.

74. (Original) The insert of Claim 73, wherein the metallic layer is selected from the group consisting of Ti, Ni, Co, Ti-based alloys, Ni-based alloys, Co-based alloys, and Fe-based alloys.

75. (Original) The insert of Claim 73, wherein the ceramic layer is selected from the group consisting of borides, oxides, nitrides, carbides, TiN, Y₂O₃, and TaC.

76. (Original) The insert of Claim 70, wherein the composite further comprises grains having a grain size less than 2 micrometers.

77-78. (Canceled).

79. (Previously presented) The insert of Claim 68, wherein the diffusion-controlling layer is a metal selected from the group consisting of Nb, Hf, Zr, and Ta.

80. (Previously presented) The turbine engine component of claim 20 wherein the substrate comprises a titanium based alloy, wherein the shape memory alloy comprises at least one of NiTiCr and NiTiFe.

81. (Previously presented) The turbine engine component of claim 80 wherein the diffusion controlling layer comprises Nb.